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GRAPHIC ANALYSES OF OIL WELL DRILLING AND PRODUCTION, 1937-1955


Lester L. Whiting
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GRAPHIC ANALYSES OF OIL WELL DRILLING ILLINOIS GEOLOGICAL AND PRODUCTION, 1937-1955 SURVEY LIBRARY

Lester L. Whiting and Margaret O. Oros

ABSTRACT

County trends in Illinois oil production from 1937 through 1955, 1951 through 1955, and for the years 1955 and 1956, are presented on four maps that show the number of holes drilled and percentage of successful drilling for each county. Annual and total production figures for 24 oil producing counties are presented in graphs.

The dollar value of oil in the Illinois mineral economy, total oil production, and producing wells and dry holes drilled in pool and wildcat categories also are shown graphically.

A brief historical summary of Illinois oil discovery and development prior to 1937 is included in the report.

HISTORICAL DEVELOPMENT

The purpose of this report is to show, primarily by graphic methods, trends relating to the discovery and production of oil in Illinois between 1937, when the first major production in the deep part of the Illinois basin was discovered, and 1956. Highlights in the discovery and history of development prior to 1937 are reviewed as background for the main report.

The search for oil and natural gas in Illinois began more than 100 years ago. The first actual production is believed to have been from one or two bore holes, drilled near Champaign in 1853, that obtained marsh gas (Blatchley, 1906). Since then drilling in the state has been nearly continuous.

In the early 1860s several holes were drilled north of Casey, in Clark County. Sufficient evidence of oil was obtained to give the name "Oilfield" to the small town that grew up in the vicinity of the drilling, but commercial production was not found until the Casey pool was discovered in 1904.

In the late 1860s several core holes were drilled in a search for coal near Litchfield in Montgomery County. Oil seepage from one of these holes, which had been improperly plugged, collected in the workings of an old mine. For years the oil was skimmed off the water and sold.

A large gas well was struck in 1882 about two and a half miles south of Litchfield. The well was later flooded out when it was deepened, but several more holes were drilled and the gas from these was conveyed by pipeline to Litchfield where it was used for domestic purposes. Continuing development led to the discovery of oil in 1889, and 1460 barrels of oil was produced during that year. A total of 6576 barrels of oil had been sold when production ceased, in 1902.

With the discovery of the Casey pool in 1904, the importance of Illinois as an oil producing area was assured. Production, which amounted to 181,084 barrels in 1905, rose rapidly during the next five years, and in 1910 amounted to 33,143,362 barrels. As a result, Illinois ranked ninth among the oil produc-

Table 1. - Illinois Oil Production
Thousands

January

County	Total	Trenton	Silurian	Devonian	Salem-St. Louis	Rosiclare	Ste. Genevieve	Aux Vases
Bond	1,290	450		50				
Christian	4,872		300	2,550		900		
Clark	47,000*	200		1,800	22,000			600
Cumberland	21,866						226	
Clay	72,300						39,600	6,500
Clinton	50,202	2,520	1,610	23,200	190			
Coles	11,150					6,600	100	150
Crawford	168,800				600		3,000	500
Edgar	1,700						1,160	
Edwards	23,953						11,320	2,211
Effingham	6,500					200	3,300	800
Fayette	197,210			15,800	10			1,000
Franklin	39,460			25	60	200	2,900	2,240
Gallatin	20,435						150	1,000
Hancock- McDonough	4,475			4,475				
Hamilton	71,810						7,000	54,700
Jasper	26,800						25,750	50
Jefferson	44,883			160	16	1,000	8,200	4,500
Lawrence	265,300						34,000	2,000
Macon	80		80					
Macoupin	128							
Madison	11,990	2,672	8,500	427				
Marion	273,092	4,020	1,000	44,185	400	9,358	46,500	50,530
Montgomery	74							
Perry	150	2						
Randolph	1,288		1,288					
Richland	58,827						38,700	100
St. Clair	2,800	2,800						
Saline	1,470						25	700
Shelby	402							244
Wabash	57,306						5,895	1,000
Washington	13,866	35	231	988		7		
Wayne	122,825						84,125	36,250
White	134,435						16,933	27,581
TOTAL	1,758,739	12,699	13,009	93,660	23,276	18,265	328,884	192,656

* Totals for Clark County and State include 300,000 bbls. from Carper sand (Warsaw) not listed in chart.

GRAPHIC ANALYSES - DRILLING AND PRODUCTION 3

by Counties and Pays, 1888-1954
of barrels

1955

Benoist (Yankee- town)	Bethel (Paint Creek)	Sample	Cypress	"Jackson"	Hardins- burg	Tar Springs	Walters- burg	Palestine	Clore- Degonia	Pennsyl- vanian
750			40							
1,122										
200										21,900
										21,640
4,510	200		19,500			2,000				
16,018			6,664							
			4,300							
400	200		100							164,000
										540
400	900	260	1,565		20	60	2,575		10	4,632
600			1,600							
36,700	32,700		111,000							
580	200		1,363		40	31,850				2
15	40		5,850	10	550	6,500	4,000	2,100	60	160
2,000	2,700		2,350		200	2,860				
			1,000							
31,000										7
500	22,000	6,000	125,000	500	100	200				75,000
										128
										391
110,405			5,844							850
				4						70
			148							
	20		20,000					7		
	5		400		100	50	140	50		
158										
50	8,128	3,600	23,695	50	10	1,310	1,120	250		12,198
12,255			350							
	200		2,000			250				
<u>250</u>	<u>15,300</u>	<u>4,100</u>	<u>23,720</u>	<u> </u>	<u>8,521</u>	<u>9,060</u>	<u>19,972</u>	<u>3,395</u>	<u>1,830</u>	<u>3,773</u>
217,913	82,593	13,960	356,489	564	9,541	54,140	27,814	5,795	1,900	305,291*

ing states during 1906, raised its position to third in 1907, and held that position for several years. After 1913, when the major development in the eastern fields comprising Clark, Cumberland, Edgar, Crawford, and Lawrence counties was essentially over, production gradually declined again until by 1936 it was less than 4,500,000 barrels annually and Illinois ranked 14th in the nation.

A reversal in the downward trend came in 1937 with the discovery and development of new producing areas at Clay City, Noble, Patoka, New Centralia, Olney, Cisne, Beecher City, and Rinard. The development after discovery of the Salem pool in 1938 added still further gains and as a result Illinois ranked fourth in the national picture during 1940 and 1941. Since then it has slowly lost ground, now ranking eighth in the nation, but is still in first place among states east of the Mississippi River.

MILESTONES

Drillers in search of oil have penetrated rock of pre-Cambrian age in eight holes, one each in Boone, DeKalb, Monroe, and Winnebago counties, and two in both Lee and Pike counties. One of the holes in DeKalb County penetrated 638 feet of pre-Cambrian rock before it was abandoned.

Several hundred holes, including those listed above, were drilled to the St. Peter sandstone or deeper, but to date the St. Peter has not produced oil, although one test in the Mattoon pool in Coles County had a show of oil in the St. Peter.

The oldest rocks that produce oil in Illinois are in the Trenton formation of Ordovician age. These beds had produced more than 12.7 million barrels of oil by the end of 1954 (table 1). The deepest producer, the Kingwood Oil Co. No. A-24 Shanafelt in the Salem pool, was completed in the Trenton for 54 barrels a day at a plugged total depth of 4780 feet. It had been drilled originally to a depth of 5256 feet in the St. Peter sandstone. The top of the Trenton is at 4537 feet.

Three holes, two in the Centralia pool and one in the Salem pool, were completed initially for more than 10,000 barrels of oil a day, producing from Devonian limestone. The largest of these, the Adams Oil and Gas No. 17-D Copple in sec. 35-2N-1W, made 12,000 barrels a day. This represents the largest initial production for any well drilled in Illinois. The top of the Devonian is at 2844 feet.

The deepest hole drilled was the Superior Oil Company's No. 17 Ford "C" in sec. 27-4S-14W, New Harmony Consolidated pool in White County. It was drilled to 7682 feet in the Shakopee formation, later plugged back to 3796 feet, and completed in September 1952 for 20 barrels of oil and 10 barrels of water daily from the Salem formation. The top of the Salem is at 3753 feet.

Three formations have produced more than 300 million barrels of oil each. The Cypress formation of Chester (Upper Mississippian) age tops the list with more than 350 million barrels. The Ste. Genevieve (Lower Mississippian), with more than 325 million barrels, and the various Pennsylvanian sands, which furnished about 305 million barrels, are second and third, respectively, as shown in table 1. This table was prepared for "The Eastern Interior (Illinois) Basin as a Habitat for Oil," by Alfred H. Bell and David H.

Swann, presented at the meeting of the American Association of Petroleum Geologists in New York City, March 1955.

Gas, except locally, is of no great economic significance in Illinois. However, gas is present and occasionally a large well is completed. Largest to date is the Richardson No. 1 Coombs Estate in the Cooks Mills pool of Coles County, which was completed for 24 million cubic feet per day from the Cypress sand. This area is currently being considered as a gas storage area.

A summary of drilling shows that approximately 80,000 tests have been drilled in the search for oil in Illinois during the past century. About 48,000 of these holes resulted in producing wells, which total gives Illinois an all-time success ratio of 60 percent.

The following graphs, thirteen in number, and the supplementary tables are intended to be self-explanatory. They were designed to present the essential facts of Illinois drilling and production from which valid inferences can be made relative to the oil future of the state. For complete details refer to the annual statistical reports.

DOLLAR VALUE OF ILLINOIS MINERALS

Figure 1 shows the annual dollar value of all minerals produced in Illinois. Minerals other than oil, in their relative order of importance, include coal, limestone and dolomite, clay products, sand and gravel, fluorspar, and the metals zinc, lead, and silver.

Oil represents approximately one-third of the total annual mineral value for Illinois, and in one year, 1940, it exceeded the value of all other minerals combined. The combined value of all minerals during 1955 was almost 600 million dollars, with oil accounting for slightly over 250 million dollars. In 1937 the combined value had been \$130,000,000, and the oil value \$10,000,000.

ANNUAL PRODUCTION GRAPH, 1905 TO 1955

Figure 2 shows yearly production of oil in Illinois since 1905. The graph illustrates the importance of the "Old Fields" area, which reached a peak production of 33,686,238 barrels during 1908. Production gradually declined after 1910, and during 1936 only 4,475,000 barrels of oil were produced.

Following the start of "basin" drilling in 1937, the peak production year was 1940, with 146,788,000 barrels of oil, due largely to Devonian production in the Centralia and Salem pools. Production declined sharply from this peak until 1953 when some 59,000,000 barrels were produced.

The Siggins "pilot flood" in 1942 was the first intentional attempt to obtain more production by injecting water to flush out additional oil. The vertically lined portion of figure 2 shows the proportion of oil recovered by secondary methods since 1944.

Since 1953, production has been climbing again. Both waterflooding and fracture treatment of wells have been contributing factors.

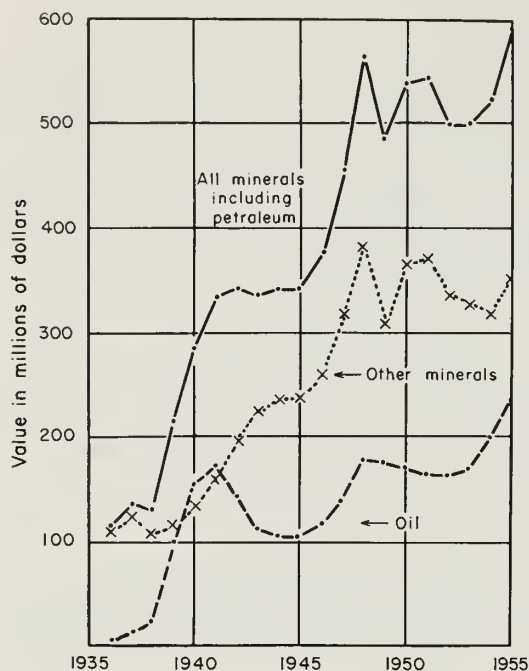


Fig. 1. - Value of oil, other minerals, and total value of all minerals produced in Illinois over the 20-year period 1935-1957.

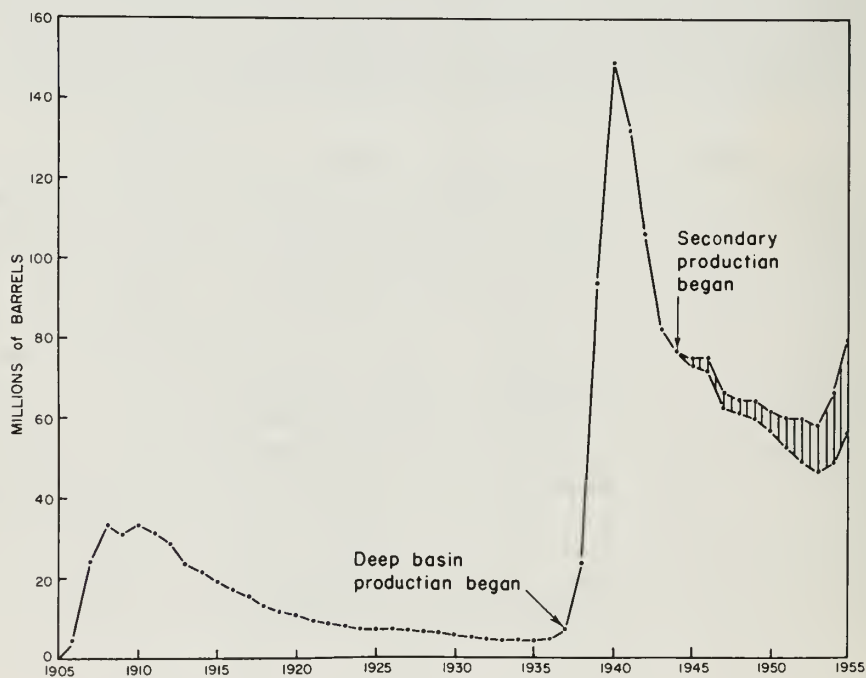


Fig. 2. - Production of oil and gas, 1905 to 1955.

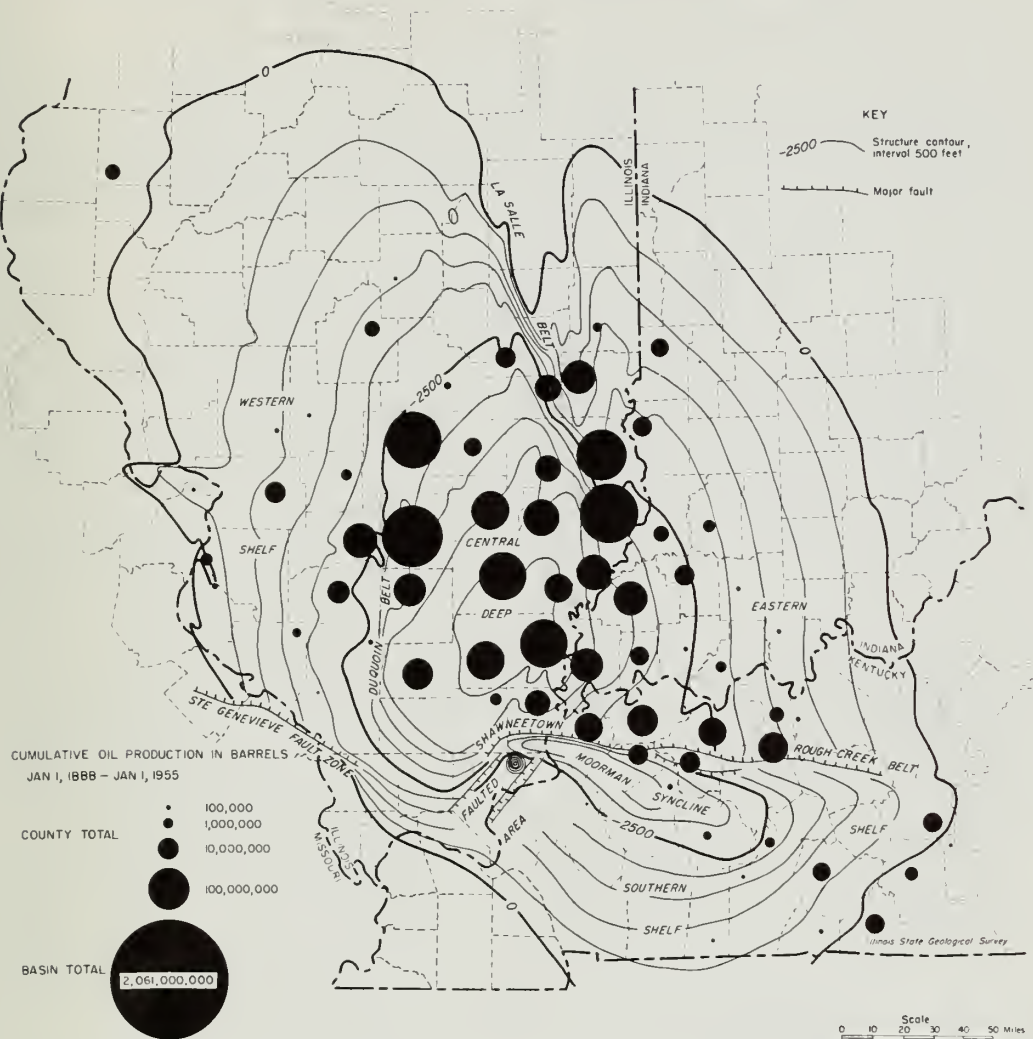


Fig. 3. - Structure of the Illinois basin on the base of the New Albany shale, and cumulative oil production by counties. (Swann and Bell, unpublished ms.)

GEOGRAPHIC DISTRIBUTION OF OIL PRODUCTION

Figure 3 shows the distribution of total oil production to January 1, 1955, by counties, in the whole Illinois basin, which includes parts of Indiana and Kentucky. The relation of the major and minor oil producing areas to the principal structural features of the basin are shown by this map.

For example, the four highest ranking counties are located in areas marginal to the central deep; Lawrence and Crawford counties are on the La Salle belt east of the central deep, and Marion and Fayette counties are on the DuQuoin belt west of the central deep. Most of the other counties that have major oil production are in or near the central deep. It is noteworthy that there has been little oil production south of the Shawneetown - Rough Creek fault belt.

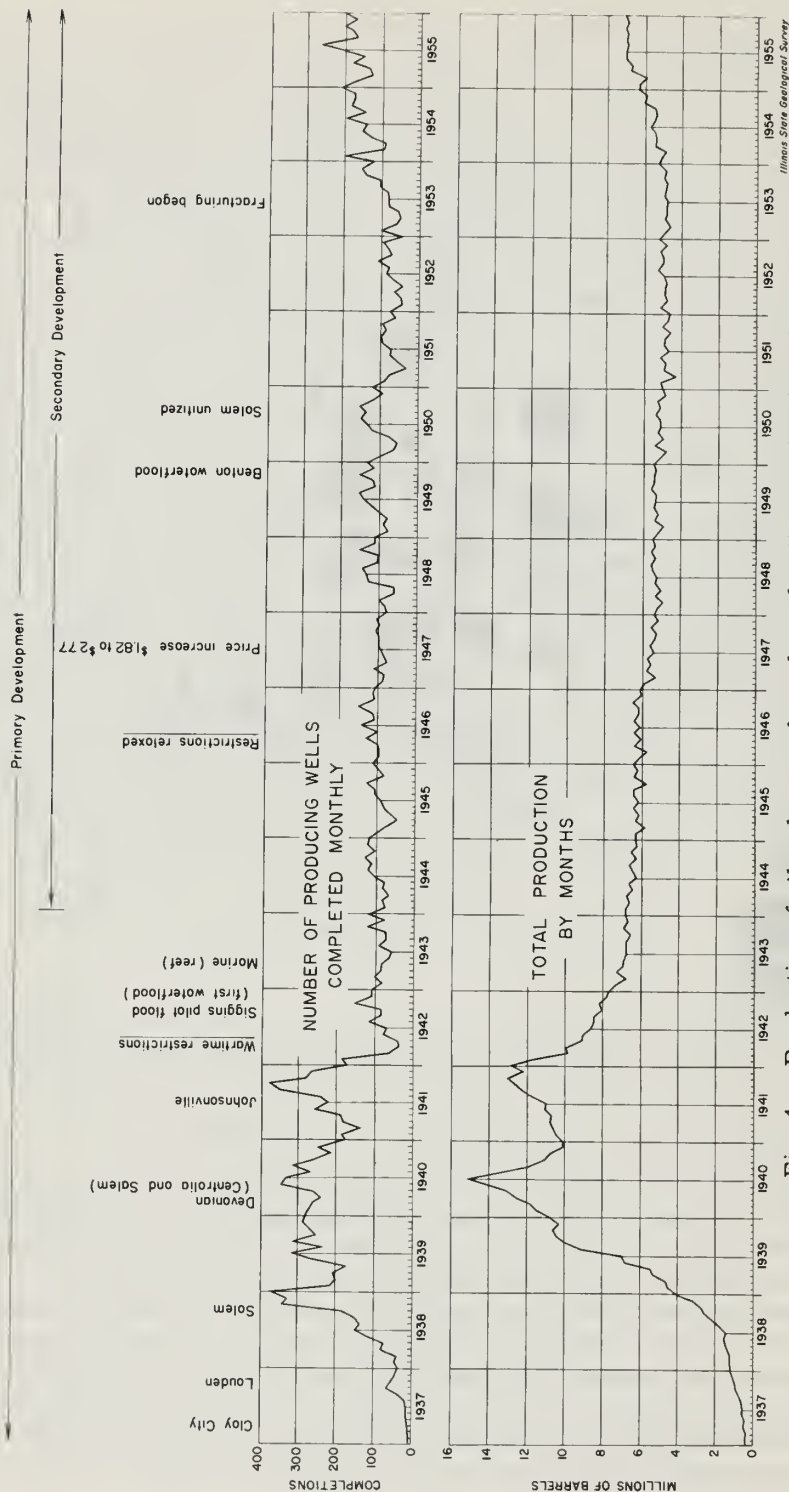


Fig. 4. - Production of oil and gas and number of wells completed, with historical highlights, 1937-1955.

GRAPH OF PRODUCTION AND WELL COMPLETIONS,
1937-1955

Figure 4 is a two-part graph - the lower part shows total monthly production and the upper portion gives the monthly total of completed producers. Some of the significant events that affected the rates of drilling and production are noted at the top of the graph.

RATIO OF PRODUCERS TO DRY HOLES
IN POOL AND WILDCAT DRILLING

Figure 5 permits a comparison of producers and dry holes in three categories: A - all holes drilled more than half a mile from nearest production, B - all holes drilled more than two miles from nearest production (shown only since 1942 when differentiation on this basis began), and C - all holes drilled in pools.

In graph C the phenomenal ratio of producers to dry holes indicated from 1938 through 1941 is due in large measure to development in the Salem-Centralia area.

PERCENTAGES OF DRILLING SUCCESS, BY COUNTY

Figures 6, 7, 8, and 9 show the likelihood of obtaining oil production in any given county as indicated by the relationship of producers to total holes drilled to date. The ratios for each county are expressed on the maps as percentage of success.

The figures show the percentages, on a county basis, for four different periods. Figure 6 is for the 19-year period following the discovery of oil in the deeper portion of the Illinois basin in 1937. Figure 7 is for the 5-year period, 1951-1955. Figures 8 and 9 are for 1955 and 1956, respectively. County percentages for each year (1937 through 1955), were calculated and are given in table 4. Criteria used in determining the percentage values are included in the discussion of table 4.

To permit evaluation of oil possibilities, the counties are divided into five classes: unlikely (0 percent); slight (1 to 10 percent); fair (11 to 30 percent); good (31 to 60 percent); and excellent (61 to 100 percent). Thus, for example, Jefferson County with 56 percent success would be classified as having "good" chances. These classes are indicated by shading on the maps.

Figure 6, indicating drilling success from 1937 through 1955, shows a concentration of "excellent" prospects across the central part of the Illinois basin. Edwards County, three percentage points below the "excellent" rating, is the only county in a solid block of ten in this part of Illinois which falls outside this classification. All of the counties in the "excellent" class have had more than 2,000 holes drilled and two of them have been tested by more than 4,000 holes. It is possible that the "excellent" area continues southeastward from Wabash and White counties, Illinois, into Gibson and Posey counties, Indiana.

The counties surrounding the "excellent" area, except for Shelby and Montgomery counties to the northwest, have "good" prospects. The "good"

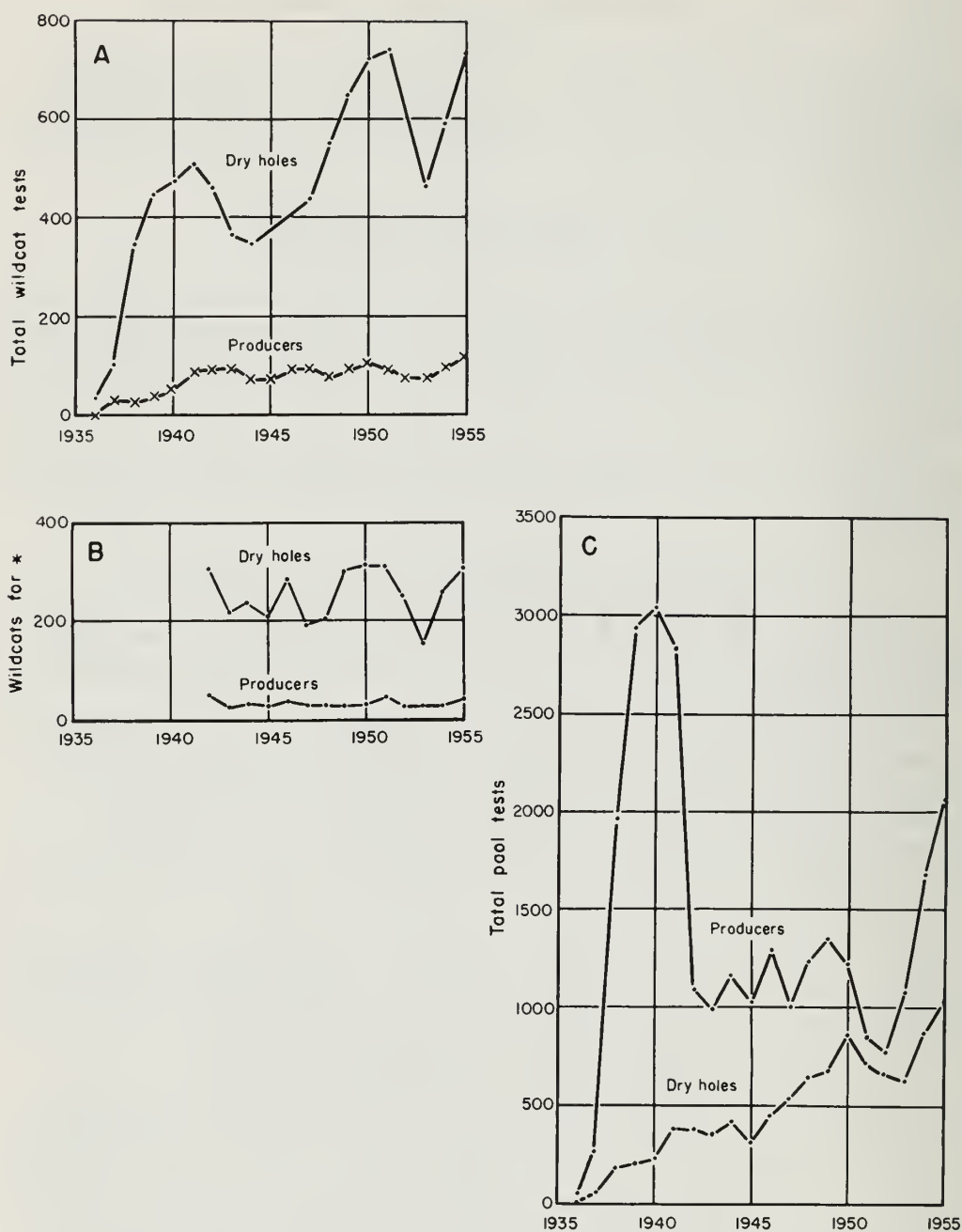


Fig. 5. - Number of producers and dry holes shown for (A) wildcat tests, (B) wildcat far tests, and (C) pool drilling.

counties are in turn surrounded by counties in the "fair," "slight," or "unlikely" classification.

Collectively, the counties in the "fair," "good," and "excellent" classifications include all of the deeper part of the basin plus a considerable portion on the shelf, both to the west and northeast. It is interesting to compare the area covered under these three classifications with that classified as "best" by Dr. Alfred H. Bell in 1930, using a geologic approach (Bell, 1931, 1955). The similarity of the areas outlined in each case is striking.

The percentage values shown for each county on figure 6 are considered as the base percentages because they are determined by all the drilling from 1937 through 1955.

Two obvious inferences may be drawn from figure 6. First, that the best chances of obtaining a producing well in Illinois is in Marion or Fayette counties, which have success ratios of 82 and 81 percent, respectively. And second, that counties like Douglas, Morgan, or Williamson, which have ratios of 3, 5, and 2 percent respectively, offer little incentive for future exploration. However, attention must be called to two factors that affect the validity of such inferences. First, how reliable is an estimate based on only a few holes (for example, the 3 percent success for Douglas County based on 38 holes)?

Confidence limits for the binominal distribution provide one means of answering this question. Using a 95 percent confidence coefficient (this means that 5 times out of 100 we will be in error), confidence limits were obtained from standard tables (Dixon and Massey, 1951, p. 322, table 9c) and are given below for Douglas County.

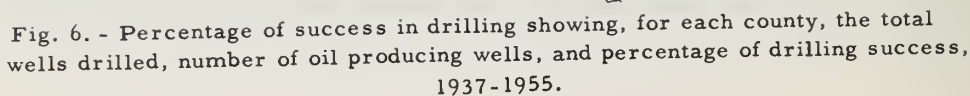
Table 2. - Confidence Limits for Douglas County

	No. of Holes	Producers	Percentage of success	95% Confidence limits
1937-55	38	1	3	0 to 16
1951-55	21	1	5	0 to 25
1955	12	1	8	0 to 42
1956	248	106	41	35 to 46
1937-56	286	107	37	31 to 44

The essential conclusion indicated is that an increase in number of holes narrows the confidence limits, a fact reflected in the first four lines of table 2.

However, as shown in the fourth line of table 2, with more holes used the percentage of success falls well outside the confidence limits previously established. In the fifth line, with an even greater number of holes, not only does the percentage of success fall outside the previously established confidence limits but the confidence limit itself widens. Why? Obviously because of pool activity with its concentrated drilling.

This latter situation is more strikingly illustrated by the drilling in Marion and Fayette counties, statistics for which are given below in table 3. In these counties the 1937-1955 success percentages are 82 (4154 holes) and 81 (2977 holes).



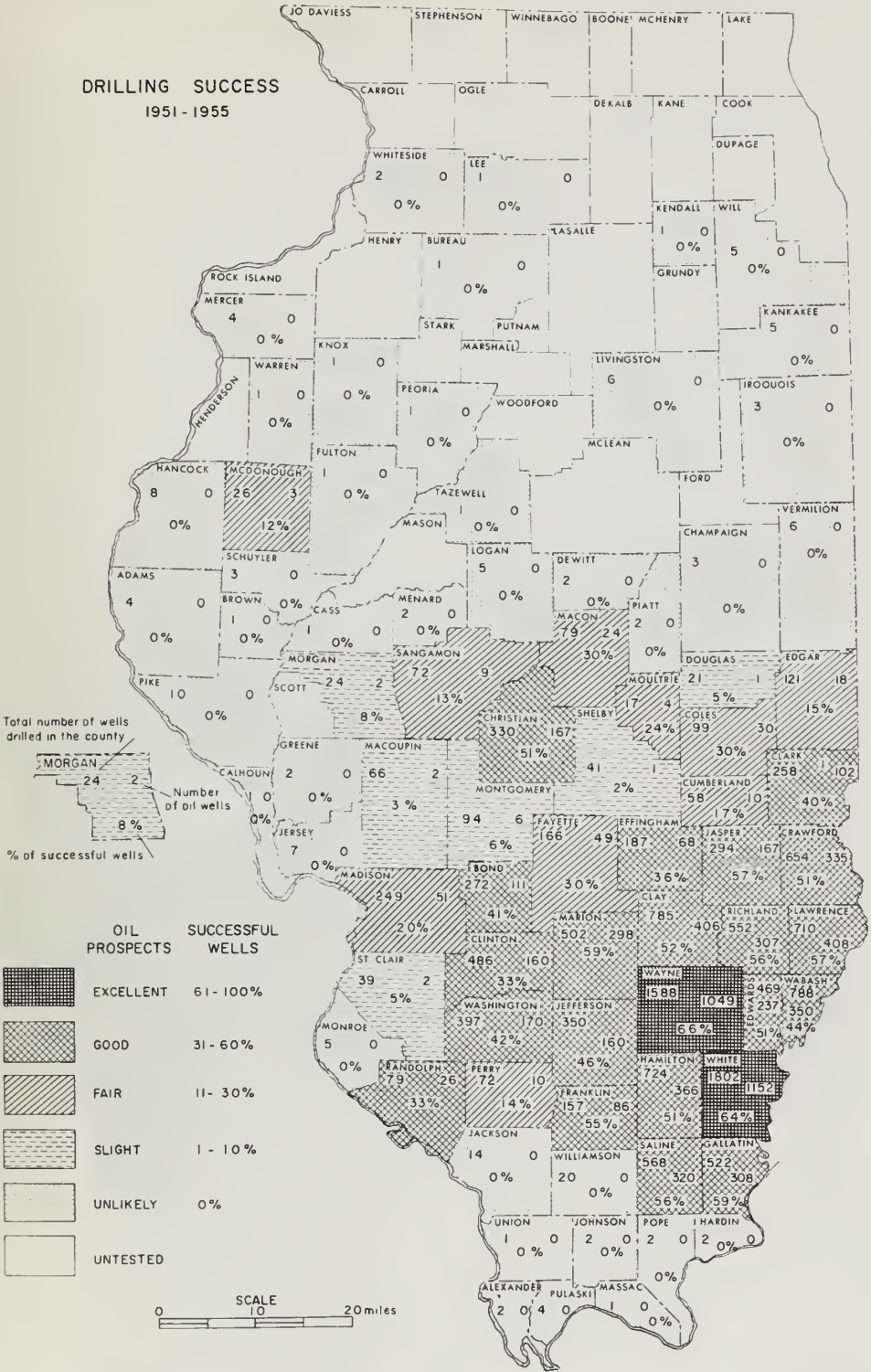


Fig. 7. - Five-year summary of percentage of drilling success, 1951-1955.

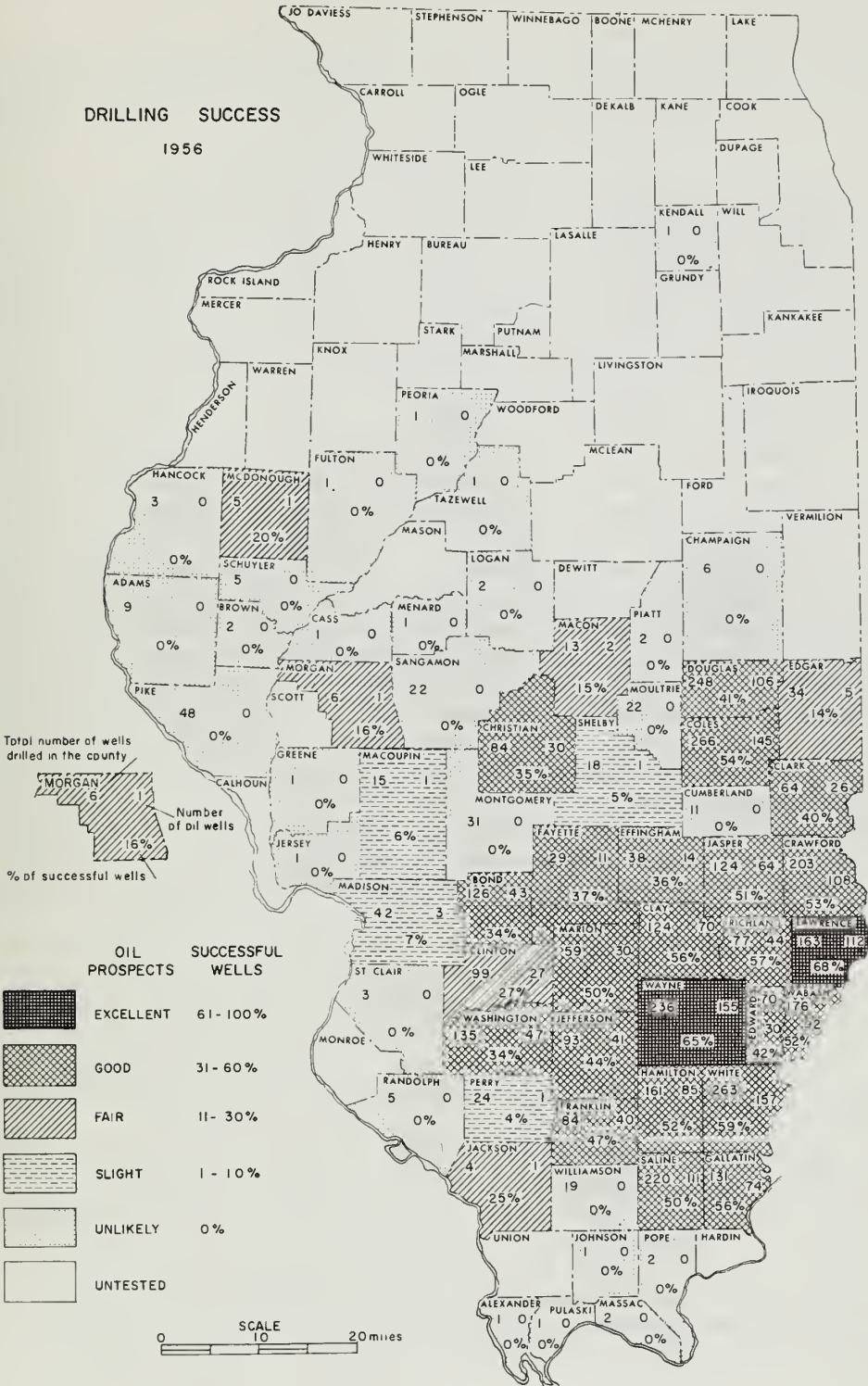


Fig. 9. - Drilling record for 1956 showing percentage of drilling success.

Table 3. - Confidence Limits for Marion and Fayette Counties

	No. of holes	Producers	Percentage of success	95% Confidence limits
Marion County				
1937-55	4,154	3,419	82	-
1951-55	502	298	59	51 to 64
1955	92	53	58	42 to 68
1956	59	30	50	36 to 64
1937-56	4,213	3,449	82	-
Fayette County				
1937-55	2,977	2,413	81	-
1951-55	166	49	30	23 to 39
1955	18	4	22	6 to 47
1956	29	11	37	20 to 57
1937-56	3,006	2,424	81	-

Because a large number of the holes in Marion and Fayette counties represent concentrated drilling in the very large Salem and Loudon pools, which have 2759 and 2171 holes respectively, the percentages of success are much too optimistic and should not be used as guides to future drilling. This is indicated by the fact that short-term percentages of success shown in lines 2, 3, and 4 for each county always are significantly below the long-term percentages shown in lines 1 and 5.

The main conclusions to be drawn from the foregoing discussion and tables are that:

1) So long as the confidence limits for any given area continue to narrow and the success percentages obtained by additional drilling fall within these limits, the percentage value shown on figure 6 may be accepted with reasonable assurance.

2) When the percentage of success obtained by annual drilling for any given area falls significantly above or below the confidence limits established by long-term drilling, the percentage value shown on figure 6 should be accepted with caution.

As long as these limitations are kept in mind, the percentage values shown in figure 6 can be helpful in determining areas of the state that merit additional exploration.

One further comment should be made relative to the maps. Production possibilities in the northern half of the state and in the southern two tiers of counties are indicated as unlikely. This is in accord with drilling statistics, but there are decided geological differences between the two areas.

In the northern part of Illinois, rocks of Devonian, Silurian, or Ordovician age are at the surface or lie directly below Pleistocene or Pennsylvanian sediments. Thus the prolific producing beds of Mississippian age, which have accounted for more than two-thirds of the oil recovered to date in Illinois, are absent.

In the southern counties nearly all the producing formations are present, but drilling to date indicates the pay zones may be tight in this area. However, the number of holes drilled so far are too few to prove that none of the area is oil bearing.

COUNTY PRODUCTION GRAPHS

Figures 10, 11, 12, and 13 are post graphs that show annual production (solid portion) and accumulated production (open portion) since 1937 for 24 counties in Illinois that had produced more than 4,000,000 barrels of oil by the end of 1955. For counties that produced oil before 1937, a single open post in the 1936 position represents the accumulated production to that time.

Each figure represents a group of six counties that had accumulated productions of 4 to 15 million, 15 to 45 million, 45 to 80 million, or more than 80 million barrels of oil, respectively. The scale used for the counties within each group is constant but a different scale is used for each group.

In counties in which an intentional controlled waterflooding program is in operation, the year the program was started and the pool in which it is located are shown in the graph. Subsequent floods in the counties are not indicated. Further data on this subject are given in the waterflood summaries prepared annually by the Illinois State Geological Survey.

One other county, Saline, has produced nearly 5.5 million barrels of oil as of January 1, 1956. Although Saline County obtained its first production in 1941, the amount of oil recovered before 1953 was insignificant, being less than 20,000 barrels. Production in 1953, 1954, and 1955 amounted to 640 thousand, 791 thousand, and 4 million barrels, respectively.

Eighteen additional Illinois counties have produced less than 4 million barrels of oil. These are, in the order of their importance, St. Clair (3 million), Bond (2.3 million), Randolph (1.6 million), Edgar (1.4 million), and Shelby, Monroe, Macon, Perry, Montgomery, Sangamon, Moultrie, Macoupin, Jackson, Douglas, Hancock, Kankakee, Morgan, and Williamson. None of the latter have produced as much as half a million barrels.

DETAILED COUNTY STATISTICS

Table 4 gives a year by year breakdown of drilling in each county in Illinois from 1937 through 1955.

The first column for each county lists the number of new holes completed each year. These figures do not include former dry tests that have been reworked. Because the emphasis in this report is on oil production, bedrock gas wells are here considered as dry holes. They are included in the figures given in the first column. Gas wells have been completed in Adams, Champaign, Livingston, and Pike counties, as well as in many counties that also produce oil.

The second column lists the number of holes completed as oil producers, including former dry holes which were reworked and made into producers. The number of such reworked wells is indicated by superscript figures (Wayne 3821⁸⁸).

The third column represents percentage of success as determined by the figures listed in columns one and two.

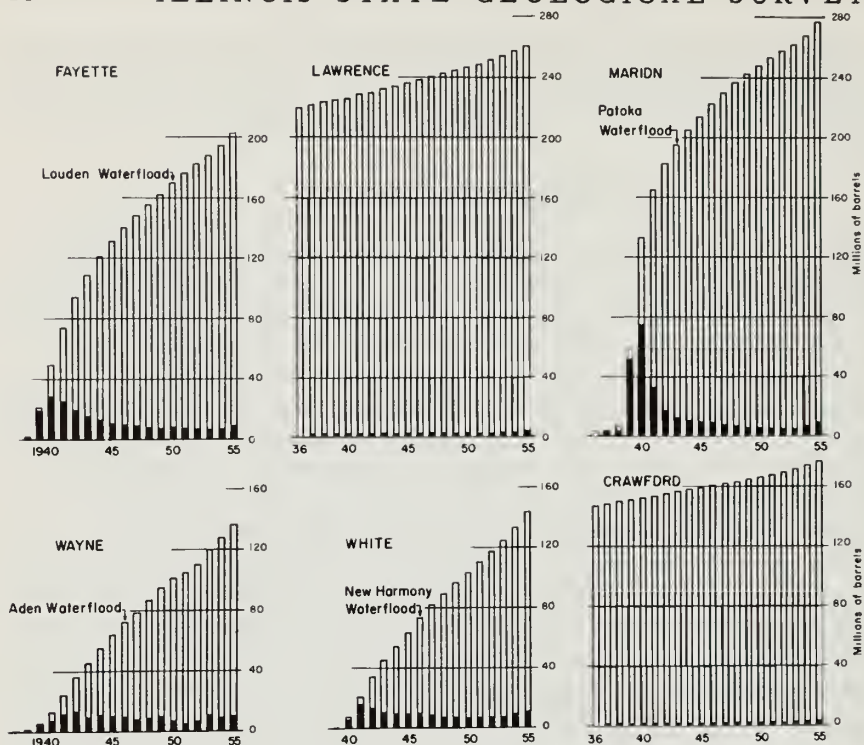


Fig. 10.

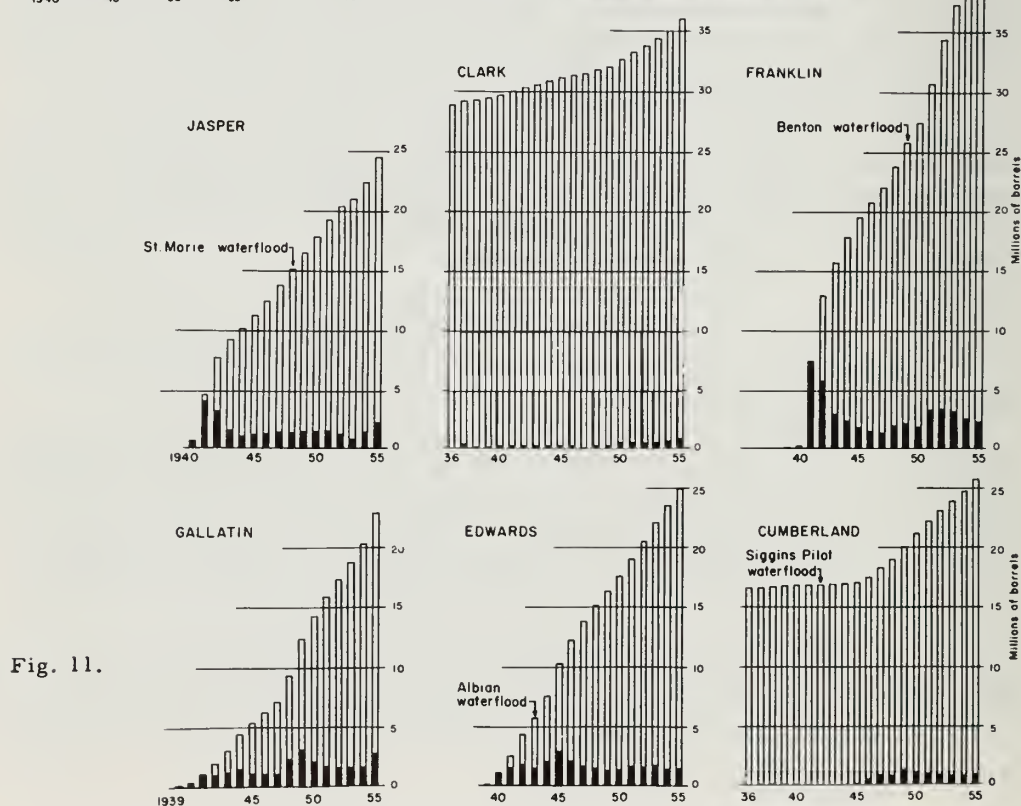


Fig. 11.

County production statistics, annual and cumulative.

Fig. 12.

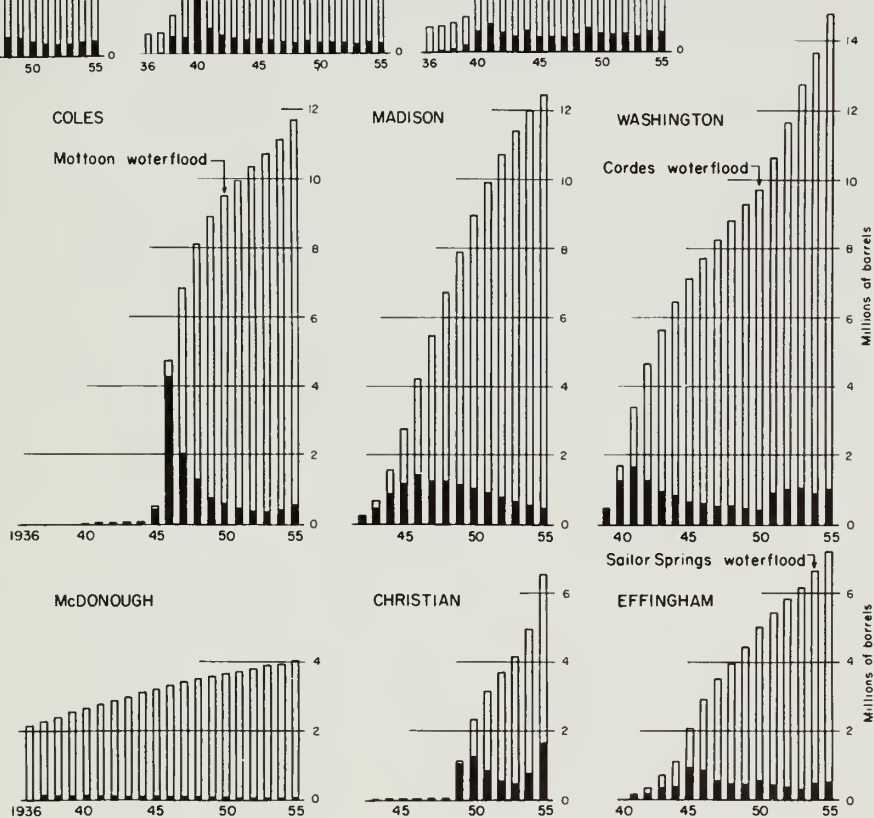
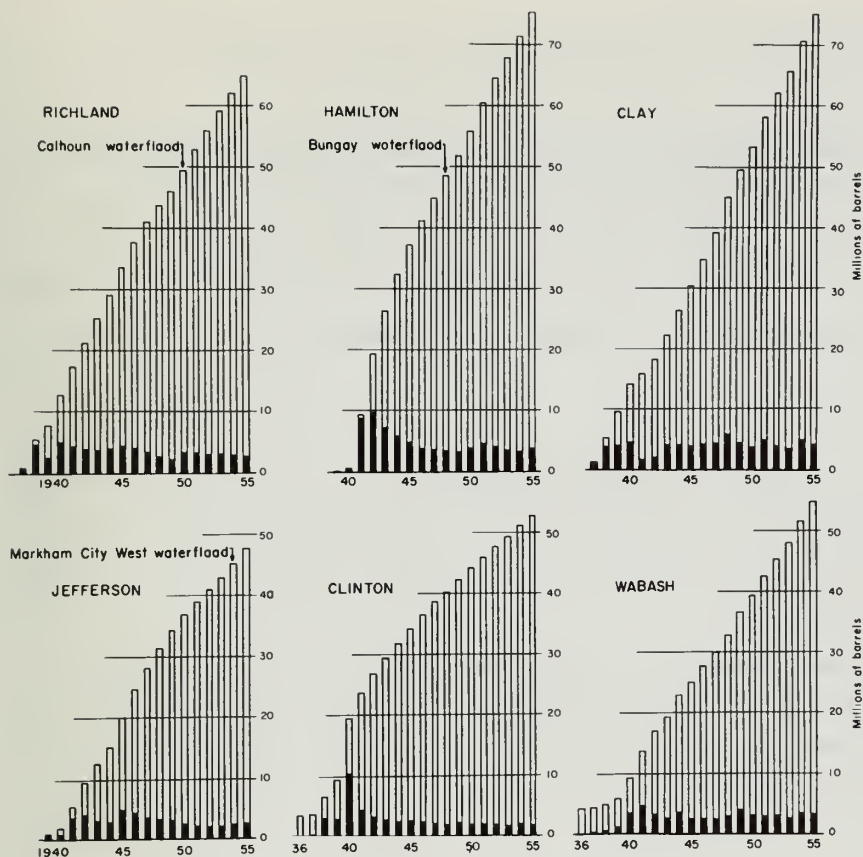


Fig. 13.

County production statistics, annual and cumulative.

The figures used above do not include the following:

- 1) Workover information on either reworked dry holes resulting in dry holes or on reworked producers resulting in producers or dry holes.
- 2) Holes drilled specifically for gas input, water input, stratigraphic tests, or structure tests.
- 3) Water wells, many of which have penetrated deep into bedrock formations.
- 4) Pleistocene "drift" gas wells. There are more than 500 such gas wells in the state.

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Table 4. - Percentage of Success in Drilling, by County and by Year

Superscript figures indicate wells originally completed as dry holes but worked over into producers

	BOND			CHRISTIAN			CLARK			CLINTON		
	Wells	Producers No.	%	Wells	Producers No.	%	Wells	Producers No.	%	Wells	Producers No.	%
1937	5	0	0	3	0	0	7	3	43	29	15	52
1938	12	1	8	4	0	0	24	7	29	444	398	90
1939	7	0	0	4	0	0	20	4	20	62	35	56
1940	54	26	48	1	0	0	15	5	33	450	369	82
1941	21	4	19	3	0	0	20	8 ¹	40	64	25	39
1942	16	3	19	2	0	0	11	1	9	59	29 ¹	49
1943	13	0	0	4	1	25	6	2	33	44	9	20
1944	18	7	39	0	0	-	22	9	41	19	1	5
1945	3	0	0	1	1	100	5	1	20	27	11	41
1946	12	0	0	7	1	14	8	2	25	53	23 ¹	43
1947	19	9	47	3	1	33	46	11 ¹	24	46	21	46
1948	15	2	13	5	2	40	37	10	27	42	24	57
1949	23	11	48	172	130	76	50	16	32	103	72 ¹	70
1950	58	27	47	18	7	39	105	40 ¹	38	165	82 ¹	50
1951	39	4	10	27	10	37	57	26	46	120	41	34
1952	25	2	8	22	5 ¹	23	59	22	37	84	24 ²	29
1953	14	0	0	34	21 ¹	62	41	11 ²	27	68	12 ¹	18
1954	31	12 ¹	39	152	87 ³	57	34	10	29	121	50 ¹	41
1955	163	91 ¹	56	95	44 ¹	46	67	33	49	93	33 ²	35
Total	548	199 ²	36	557	310 ⁶	56	634	221 ⁵	35	2093	1274 ¹⁰	61

	CLAY			COLES			CRAWFORD			CUMBERLAND		
	Wells	Producers No.	%	Wells	Producers No.	%	Wells	Producers No.	%	Wells	Producers No.	%
1937	91	75	82	1	0	0	20	13	65	0	0	-
1938	153	141	92	7	0	0	19	7	37	5	0	0
1939	159	136	86	17	3	18	7	2	29	11	0	0
1940	37	23	62	9	1	11	13	2 ¹	15	1	0	0
1941	93	60 ¹	65	8	1	13	5	1	20	0	0	-
1942	137	75 ¹	55	12	1	8	16	3	19	5	0	0
1943	201	148	74	8	1	13	7	0	0	10	0	0
1944	176	136 ¹	77	14	10	71	5	1	20	6	1	17
1945	105	63	60	93	61 ¹	66	7	4	57	3	0	0
1946	186	108	58	378	299	79	10	3	30	50	26	52

Table 4. (continued)

	CLAY			COLES			CRAWFORD			CUMBERLAND		
	Wells	Producers No.	%	Wells	Producers No.	%	Wells	Producers No.	%	Wells	Producers No.	%
1947	196	130 ⁵	66	38	21	55	19	8	42	19	4	21
1948	310	183	59	49	26	53	18	5	28	16	7	44
1949	167	103 ²	62	22	2	9	27	14	52	6	0	0
1950	130	70	54	18	0	0	53	15	28	9	2	22
1951	150	61	41	19	5 ¹	26	56	30	54	16	4 ¹	25
1952	92	26 ¹	28	9	0	0	72	45	63	5	1	20
1953	119	64 ⁶	54	10	1	10	74	30 ²	41	9	2	22
1954	225	138 ¹³	61	12	3	25	219	97 ³	44	18	3	17
1955	199	117 ⁴	59	49	22	45	233	133	57	10	0	0
Total	2926	1857 ³⁴	63	773	457 ²	59	880	413 ⁶	47	199	50 ¹	25

	DOUGLAS			EDGAR			EDWARDS			EFFINGHAM		
	Wells	Producers No.	%	Wells	Producers No.	%	Wells	Producers No.	%	Wells	Producers No.	%
1937	0	0	-	1	0	0	1	0	0	4	0	0
1938	0	0	-	5	0	0	0	0	-	8	0	0
1939	2	0	0	9	0	0	34	17	50	13	1 ¹	8
1940	2	0	0	10	0	0	79	62	78	12	3	25
1941	2	0	0	9	1	11	52	36	69	32	18 ¹	56
1942	0	0	-	3	0	0	49	31 ¹	63	38	18 ²	47
1943	1	0	0	1	0	0	68	37	54	44	29	66
1944	2	0	0	0	0	-	143	97 ²	68	38	15	39
1945	0	0	-	3	0	0	145	105	72	88	55	63
1946	0	0	-	7	0	0	65	38 ¹	58	42	12	29
1947	1	0	0	12	1	8	77	34 ¹	44	39	19	49
1948	1	0	0	5	1	20	63	30 ³	48	33	8	24
1949	3	0	0	155	64	41	70	34 ³	49	23	12	52
1950	3	0	0	113	40	35	106	58 ²	55	71	36 ²	51
1951	4	0	0	34	4	12	103	42 ³	41	48	20	42
1952	4	0	0	20	2	10	101	45 ⁵	45	23	4 ²	17
1953	0	0	-	24	7	29	119	72 ⁴	61	19	4	21
1954	1	0	0	20	3	15	62	31 ⁷	50	39	16	41
1955	12	1	8	23	2	9	84	47 ⁴	56	58	24	41
Total	38	1	3	454	125	28	1421	816 ³⁶	57	672	294 ⁸	44

GRAPHIC ANALYSES - DRILLING AND PRODUCTION 23

Table 4. (continued)

	FAYETTE			FRANKLIN			GALLATIN			HAMILTON		
	Wells	Producers No.	%	Wells	Producers No.	%	Wells	Producers No.	%	Wells	Producers No.	%
1937	11	2	18	0	0	-	0	0	-	2	0	0
1938	575	509	89	6	0	0	0	0	-	1	0	0
1939	960	895	93	9	1	11	19	7 ¹	37	7	1	14
1940	577	517 ²	90	20	16	80	24	13 ¹	54	92	78	85
1941	238	191 ¹	80	277	231	83	96	64 ²	67	432	376 ⁴	87
1942	69	47	68	65	23	35	53	30	57	256	187 ²	73
1943	44	18	41	58	26 ¹	45	49	40 ¹	82	156	119 ⁷	76
1944	19	1	5	50	23	46	42	25	60	111	69 ³	62
1945	9	0	0	28	9	32	31	16 ¹	52	83	55	66
1946	24	5 ¹	21	10	1	10	22	10 ¹	45	84	42 ²	50
1947	22	3	14	49	30	61	88	46 ¹	52	100	67 ²	67
1948	12	6	50	127	78	61	217	150 ¹	69	111	71 ¹	64
1949	78	55 ³	71	116	64	55	194	115 ³	59	88	41	47
1950	173	115 ¹	66	77	39	51	123	54	44	207	116	56
1951	80	24	30	32	7	22	78	31	41	240	115 ³	48
1952	36	7	19	20	6	30	65	31 ¹	48	117	49 ²	42
1953	18	6	33	16	8 ¹	50	83	52 ⁵	63	99	53 ⁵	54
1954	14	8 ¹	57	36	25 ⁴	69	96	70 ⁷	73	77	36 ⁴	47
1955	18	4	22	53	30 ²	57	200	123 ⁵	62	191	113 ³	59
Total	2977	2413 ⁹	81	1049	617 ⁸	59	1480	878 ³¹	59	2454	1588 ³⁸	65

	HANCOCK			JACKSON			JASPER			JEFFERSON		
	Wells	Producers No.	%	Wells	Producers No.	%	Wells	Producers No.	%	Wells	Producers No.	%
1937	2	0	0	0	0	-	3	0	0	0	0	-
1938	2	0	0	3	0	0	6	0	0	68	40	59
1939	3	1	33	1	0	0	8	1	13	73	37 ¹	51
1940	2	1	50	5	0	0	63	47	75	33	16	48
1941	1	0	0	10	1	10	176	141 ¹	80	184	148 ¹	80
1942	1	0	0	5	0	0	101	72 ¹	71	84	35 ³	42
1943	1	0	0	2	0	0	26	12 ¹	46	116	65 ¹	56
1944	2	0	0	2	0	0	18	5	28	142	88	62
1945	2	0	0	2	0	0	40	18	45	173	120	69
1946	0	0	-	0	0	-	61	26	43	76	46	61

Table 4. (continued)

	HANCOCK			JACKSON			JASPER			JEFFERSON		
	Wells	Producers No.	%	Wells	Producers No.	%	Wells	Producers No.	%	Wells	Producers No.	%
1947	4	0	0	1	0	0	97	48 ²	49	51	19	37
1948	2	0	0	3	0	0	118	51 ²	43	89	40 ¹	45
1949	1	0	0	3	0	0	77	37 ⁴	48	47	23	49
1950	0	0	-	0	0	-	70	30 ¹	43	50	17	34
1951	0	0	-	0	0	-	32	9	28	52	11	21
1952	2	0	0	2	0	0	40	10 ²	25	63	26	41
1953	2	0	0	3	0	0	30	11 ³	37	52	25	48
1954	1	0	0	4	0	0	27	18 ²	67	98	53 ¹	54
1955	3	0	0	5	0	0	165	119 ²	72	85	45 ²	53
Total	31	2	6	51	1	2	1158	655 ²¹	57	1536	854 ¹⁰	56

	LAWRENCE			MCDONOUGH			MACON			MACOUPIN		
	Wells	Producers No.	%	Wells	Producers No.	%	Wells	Producers No.	%	Wells	Producers No.	%
1937	13	5	38	15	12	80	0	0	-	0	0	-
1938	36	10	28	7	2	29	2	0	0	9	0	0
1939	41	3	7	7	1	14	2	0	0	4	0	0
1940	28	6	21	9	3	33	4	0	0	9	0	0
1941	48	18	38	10	3	30	0	0	-	8	3	38
1942	58	37	64	5	1	20	1	0	0	20	1	5
1943	66	32 ¹	48	0	0	-	0	0	-	2	0	0
1944	57	21 ¹	37	3	0	0	0	0	-	3	1	33
1945	20	3	15	7	4	57	0	0	-	3	2	67
1946	51	26 ¹	51	0	0	-	2	0	0	4	0	0
1947	67	25	37	1	0	0	1	0	0	3	0	0
1948	35	12	34	3	1	33	1	0	0	1	0	0
1949	95	36	38	4	2 ¹	50	10	0	0	15	0	0
1950	184	62	34	3	0	0	5	0	0	12	1	8
1951	75	27 ¹	36	3	0	0	6	0	0	11	0	0
1952	133	71 ¹	53	6	0	0	1	0	0	7	1 ¹	14
1953	106	54 ¹	51	4	1	25	6	2 ¹	33	14	0	0
1954	141	78 ⁴	55	1	0	0	49	21 ¹	43	15	1	7
1955	255	178 ³	70	12	2	17	17	1	6	19	0	0
Total	1509	705 ¹⁴	47	100	32 ¹	32	107	24 ²	22	159	10 ¹	6

Table 4. (continued)

	MADISON			MARION			MONROE			MONTGOMERY		
	Wells	Producers No.	%	Wells	Producers No.	%	Wells	Producers No.	%	Wells	Producers No.	%
1937	1	0	0	122	93	76	0	0	-	0	0	-
1938	4	0	0	729	643	88	1	0	0	7	0	0
1939	9	1	11	1242	1162 ⁷	94	16	7	44	11	1	9
1940	7	0	0	952	895 ⁵	94	16	9 ¹	56	40	6	15
1941	3	0	0	127	96 ¹	76	3	3	100	15	1	7
1942	35	23	66	42	13	31	1	0	0	4	1	25
1943	23	14	61	61	36	59	2	1	50	10	2	20
1944	51	38	75	46	28 ²	61	2	0	0	11	3	27
1945	47	33	70	62	31	50	0	0	-	2	0	0
1946	70	54	77	48	16	33	1	0	0	1	0	0
1947	42	24	57	56	29	52	0	0	-	8	1	13
1948	43	9	21	45	17	38	0	0	-	15	2	13
1949	75	18	24	78	43 ¹	55	0	0	-	31	4	13
1950	102	19	19	42	19 ¹	45	1	0	0	23	1	4
1951	75	17	23	37	5	14	1	0	0	20	2	10
1952	35	7	20	71	28 ¹	39	2	0	0	35	4	11
1953	53	12 ¹	23	120	88 ⁵	73	0	0	-	13	0	0
1954	52	10	19	182	124 ⁴	68	1	0	0	11	0	0
1955	34	5 ¹	15	92	53 ¹	58	1	0	0	15	0	0
Total	761	284 ²	37	4154	3419 ²⁸	82	48	20 ¹	42	272	28	10

	MORGAN			MOULTRIE			PERRY			RANDOLPH		
	Wells	Producers No.	%	Wells	Producers No.	%	Wells	Producers No.	%	Wells	Producers No.	%
1937	0	0	-	0	0	-	1	0	0	1	0	0
1938	4	0	0	2	0	0	5	0	0	5	0	0
1939	1	0	0	4	0	0	16	0	0	7	0	0
1940	0	0	-	0	0	-	8	0	0	9	1	11
1941	5	0	0	1	0	0	5	0	0	7	0	0
1942	3	0	0	0	0	-	14	3	21	2	0	0
1943	0	0	-	1	0	0	5	0	0	2	0	0
1944	0	0	-	0	0	-	5	0	0	3	0	0
1945	0	0	-	1	0	0	5	0	0	0	0	-
1946	4	0	0	7	1	14	3	0	0	2	0	0

Table 4. (continued)

	MORGAN			MOULTRIE			PERRY			RANDOLPH		
	Wells	Producers No.	%	Wells	Producers No.	%	Wells	Producers No.	%	Wells	Producers No.	%
1947	1	0	0	1	0	0	5	0	0	0	0	-
1948	4	1	25	1	0	0	9	1	11	0	0	-
1949	3	0	0	6	0	0	5	1	20	3	1	33
1950	6	0	0	5	0	0	8	0	0	3	0	0
1951	1	0	0	3	0	0	9	0	0	1	0	0
1952	0	0	-	2	0	0	33	9	27	24	2	8
1953	8	1	13	2	0	0	10	1	10	22	17	77
1954	8	1	13	1	0	0	7	0	0	22	4	18
1955	7	0	0	9	4	44	13	0	0	10	3	30
Total	55	3	5	46	5	11	166	15	9	123	28	23

	RICHLAND			ST. CLAIR			SALINE			SANGAMON		
	Wells	Producers No.	%	Wells	Producers No.	%	Wells	Producers No.	%	Wells	Producers No.	%
1937	60	48	80	2	0	0	0	0	-	0	0	-
1938	180	135	75	11	5	45	4	0	0	1	0	0
1939	102	91	89	38	21	55	7	0	0	2	0	0
1940	111	99	89	24	15	63	5	0	0	0	0	-
1941	99	69 ¹	70	38	27	71	13	2	15	0	0	-
1942	92	49	53	24	5	21	12	0	0	0	0	-
1943	47	31 ¹	66	17	0	0	2	0	0	2	0	0
1944	111	74	67	12	4	33	6	1	17	0	0	-
1945	151	106 ¹	70	3	0	0	5	2	40	1	2 ²	200
1946	161	95 ²	59	8	2	25	10	4	40	1	0	0
1947	109	68	62	3	3	100	6	1	17	1	0	0
1948	156	71	46	7	7	100	5	0	0	0	0	-
1949	71	26	37	5	8 ⁵	160	16	0	0	1	1	100
1950	149	61 ²	41	10	5	50	25	5 ¹	20	3	0	0
1951	162	60 ¹	37	3	1	33	18	4 ¹	22	4	0	0
1952	86	46 ³	53	5	0	0	12	2	17	2	0	0
1953	69	34 ³	49	7	0	0	43	28 ²	65	0	0	-
1954	122	86 ¹	70	8	0	0	140	93 ¹	66	17	2	12
1955	113	81 ³	72	16	1	6	355	193 ¹	54	49	7	14
Total	2151	1330 ¹⁸	62	241	104 ⁵	43	684	335 ⁶	49	84	12 ²	14

GRAPHIC ANALYSES - DRILLING AND PRODUCTION 27

Table 4. (continued)

	SHELBY			WABASH			WASHINGTON			WAYNE		
	Wells	Producers No.	%	Wells	Producers No.	%	Wells	Producers No.	%	Wells	Producers No.	%
1937	1	0	0	19	9	47	3	0	0	20	9	45
1938	17	0	0	23	6	26	19	0	0	107	80	75
1939	17	1	6	217	170	78	133	96	72	237	193	81
1940	11	2	18	202	145 ³	72	102	76	75	265	232 ³	88
1941	17	2	12	356	287 ²	81	69	45 ²	65	409	340	83
1942	4	0	0	95	63 ²	66	29	14	48	297	208 ⁷	70
1943	12	2	17	194	145 ¹	75	24	11 ¹	46	228	154 ³	68
1944	5	0	0	201	138 ²	69	13	4	31	330	241 ¹	73
1945	5	0	0	124	82 ³	66	25	5	20	217	142 ³	65
1946	46	9	20	182	108	59	27	1	4	312	206 ⁶	65
1947	19	3	16	301	178 ³	59	16	1	6	253	150 ³	59
1948	10	4	40	312	181 ³	58	33	9	27	342	204 ⁵	60
1949	19	2	11	357	228 ⁴	64	17	0	0	247	147 ²	60
1950	11	0	0	223	121 ¹	54	10	0	0	205	100 ⁶	49
1951	12	0	0	133	62 ³	47	47	18	38	236	118 ⁴	50
1952	12	1	8	87	35 ¹	40	49	13	27	298	158 ³	53
1953	4	0	0	115	61 ²	53	90	39	43	383	295 ³⁵	77
1954	9	0	0	203	117 ⁹	58	80	26	33	419	304 ¹⁵	73
1955	4	0	0	144	75 ²	52	131	74 ⁷	56	252	174 ⁸	69
Total	235	26	11	3488	2211 ⁴¹	63	917	432 ¹⁰	47	5057	3451 ¹⁰⁴	68

	WHITE			WILLIAMSON		
	Wells	Producers No.	%	Wells	Producers No.	%
1937	1	0	0	0	0	-
1938	4	0	0	1	0	0
1939	104	68	65	5	0	0
1940	479	412	86	5	0	0
1941	839	732 ⁴	87	10	0	0
1942	302	218 ⁵	72	7	0	0
1943	203	150 ²	74	5	0	0
1944	277	187 ¹	68	4	0	0
1945	230	154 ⁴	67	0	0	-
1946	315	223 ⁴	71	1	0	0

Table 4. (continued)

	WHITE			WILLIAMSON			
	Wells	Producers No.	%	Wells	Producers No.	%	
1947	223	137 ³	61	0	0	-	
1948	182	91 ³	50	0	0	-	Grand total holes
1949	240	131 ⁴	55	3	0	0	drilled 47,841
1950	290	166 ³	57	1	1 ¹	100	Grand total
1951	320	181 ⁵	57	1	0	0	producers 29,321 ⁵⁵¹
1952	305	152 ⁷	50	2	0	0	Percentage of
1953	247	143 ⁷	58	0	0	-	wells that are
1954	452	361 ²⁶	80	2	0	0	producers 61
1955	478	314 ¹⁰	66	15	0	0	
Total	5491	3821 ⁸⁸	70	62	1 ¹	2	



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